



## Features

- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant

## Benefits

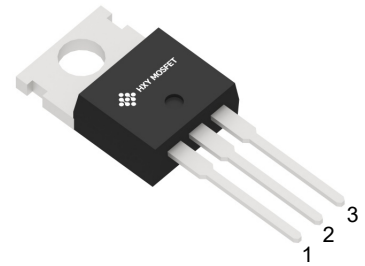
- Reduce switching losses
- Increased system Switching Frequency
- Increased power density
- Reduction of heat sink requirements

## Applications

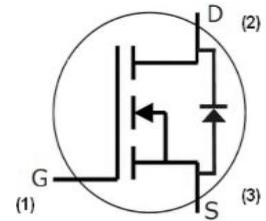
- Switch mode power supplies
- Renewable energy
- On Board Charger
- High Voltage DC/DC Converters



| Ordering Part Number | Package | Brand      |
|----------------------|---------|------------|
| IXFP34N65X2          | TO-220C | HXY MOSFET |



TO-220C



## Maximum Ratings ( $T_c = 25^\circ\text{C}$ unless otherwise specified)

| Symbol        | Parameter                      | Test conditions                                                                                         | Value     | Unit             | Note    |
|---------------|--------------------------------|---------------------------------------------------------------------------------------------------------|-----------|------------------|---------|
| $V_{DSmax}$   | Drain-Source Voltage           | $V_{GS} = 0V, I_D = 100\mu A$                                                                           | 650       | V                |         |
| $V_{GSmax}$   | Gate-Source voltage            | AC ( $f > 1\text{ Hz}$ )                                                                                | -10/+25   | V                |         |
| $V_{GSop}$    | Recommend Gate-Source Voltage  | Static                                                                                                  | -4/+18    | V                |         |
| $I_D$         | Continuous Drain current       | $V_{GS} = 20V, T_c = 25^\circ\text{C}$                                                                  | 30        | A                | Fig. 14 |
|               |                                | $V_{GS} = 20V, T_c = 100^\circ\text{C}$                                                                 | 21        |                  |         |
| $I_{D,pulse}$ | Pulsed Drain Current           | Pulse with $t_p$ limited by $T_{jmax}$ at 1 ms<br>Pulse with $t_p$ limited by $T_{jmax}$ at 100 $\mu s$ | 52<br>128 | A                |         |
| $P_D$         | Power Dissipation              | $T_c = 25^\circ\text{C}, T_j = 175^\circ\text{C}$                                                       | 125       | W                | Fig.16  |
| $T_j$         | Operating junction temperature |                                                                                                         | -55~175   | $^\circ\text{C}$ |         |
| $T_{stg}$     | Storage temperature            |                                                                                                         | -55~175   | $^\circ\text{C}$ |         |



### Thermal Characteristics

| Symbol       | Parameter                                   | Value |      |      | Unit | Note    |
|--------------|---------------------------------------------|-------|------|------|------|---------|
|              |                                             | Min.  | Typ. | Max. |      |         |
| $R_{th(jc)}$ | Thermal resistance from Junction to Case    |       | 1.2  |      | K/W  | Fig. 15 |
| $R_{th(ja)}$ | Thermal resistance from Junction to Ambient |       | 40   |      | K/W  |         |

### Electrical Characteristics (T<sub>c</sub> = 25°C unless other wise specified)

#### Static Characteristics

| Symbol        | Parameter                        | Test conditions                                                                              | Value |            |      | Unit       | Note         |
|---------------|----------------------------------|----------------------------------------------------------------------------------------------|-------|------------|------|------------|--------------|
|               |                                  |                                                                                              | Min.  | Typ.       | Max. |            |              |
| $V_{(BR)DSS}$ | Drain-Source Breakdown voltage   | $V_{GS} = 0V, I_D = 100\mu A$                                                                | 650   |            |      | V          |              |
| $V_{GS(th)}$  | Gate Threshold voltage           | $V_{GS} = V_{DS}, I_D = 5mA$                                                                 |       | 2.7        |      | V          | Fig. 9       |
|               |                                  | $V_{GS} = V_{DS}, I_D = 5mA, T_J = 175^\circ C$                                              |       | 1.8        |      |            |              |
| $I_{GSS}$     | Gate-Source Leakage current      | $V_{GS} = 20V, V_{DS} = 0V$                                                                  |       |            | 250  | nA         |              |
| $I_{DSS}$     | Zero Gate Voltage Drain Current  | $V_{DS} = 650V, V_{GS} = 0V, T_J = 25^\circ C$                                               |       | 1          | 50   | $\mu A$    |              |
| $R_{DS(on)}$  | Drain-Source On-state Resistance | $V_{GS} = 15V, I_D = 10A$<br>$V_{GS} = 20V, I_D = 10A$                                       |       | 105<br>94  | 150  | m $\Omega$ | Fig. 3, 4, 5 |
|               |                                  | $V_{GS} = 18V, I_D = 10A, T_J = 175^\circ C$<br>$V_{GS} = 20V, I_D = 10A, T_J = 175^\circ C$ |       | 140<br>130 |      |            |              |
| $g_{fs}$      | Transconductance                 | $V_{DS} = 20V, I_D = 10A$                                                                    |       | 13         |      | S          | Fig. 6       |
|               |                                  | $V_{DS} = 20V, I_D = 10A, T_J = 175^\circ C$                                                 |       | 9          |      |            |              |



### Gate Charge Characteristics

| Symbol   | Parameter             | Test conditions                                      | Value |      |      | Unit | Note    |
|----------|-----------------------|------------------------------------------------------|-------|------|------|------|---------|
|          |                       |                                                      | Min.  | Typ. | Max. |      |         |
| $Q_{GS}$ | Gate to Source Charge | $V_{DS} = 400V$<br>$I_D = 10A$<br>$V_{GS} = -4V/18V$ |       | 8.3  |      | nC   | Fig. 10 |
| $Q_{GD}$ | Gate to Drain Charge  |                                                      |       | 12.1 |      |      |         |
| $Q_G$    | Total Gate Charge     |                                                      |       | 35.8 |      |      |         |

### AC Characteristics

| Symbol       | Parameter                    | Test conditions                                                       | Value |      |      | Unit     | Note    |
|--------------|------------------------------|-----------------------------------------------------------------------|-------|------|------|----------|---------|
|              |                              |                                                                       | Min.  | Typ. | Max. |          |         |
| $C_{iss}$    | Input Capacitance            | $V_{GS} = 0V, V_{DS} = 600V$<br>$f = 1\text{ MHz}$<br>$V_{AC} = 25mV$ |       | 767  |      | pF       | Fig. 13 |
| $C_{oss}$    | Output Capacitance           |                                                                       |       | 55   |      | pF       |         |
| $C_{rss}$    | Reverse Transfer Capacitance |                                                                       |       | 7    |      | pF       |         |
| $R_{G(int)}$ | Internal Gate Resistance     | $f = 1\text{ MHz}, V_{AC} = 25mV$                                     |       | 2.8  |      | $\Omega$ |         |

### Reverse Diode Characteristics

| Symbol         | Parameter                        | Test conditions                                          | Value |      |      | Unit | Note     |
|----------------|----------------------------------|----------------------------------------------------------|-------|------|------|------|----------|
|                |                                  |                                                          | Min.  | Typ. | Max. |      |          |
| $V_{SD}$       | Diode Forward Voltage            | $V_{GS} = -5V, I_{SD} = 7.5A$                            |       | 4.0  |      | V    | Fig. 7,8 |
|                |                                  | $V_{GS} = -5V, I_{SD} = 7.5A, T_j = 175^\circ C$         |       | 3.5  |      |      |          |
| $I_S$          | Continuous Diode Forward Current | $V_{GS} = -5V, T_C = 25^\circ C$                         |       | 25   |      | A    |          |
| $I_{S, pulse}$ | Diode pulse Current              | $V_{GS} = -5V$ , pulse width $t_p$ limited by $T_{jmax}$ |       | 52   |      | A    |          |



## Typical Performance

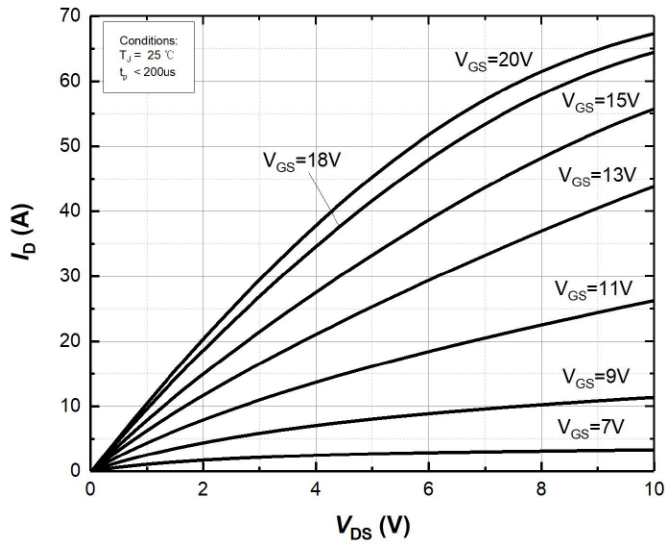


Figure 1. Output characteristics at  $T_j=25^\circ\text{C}$

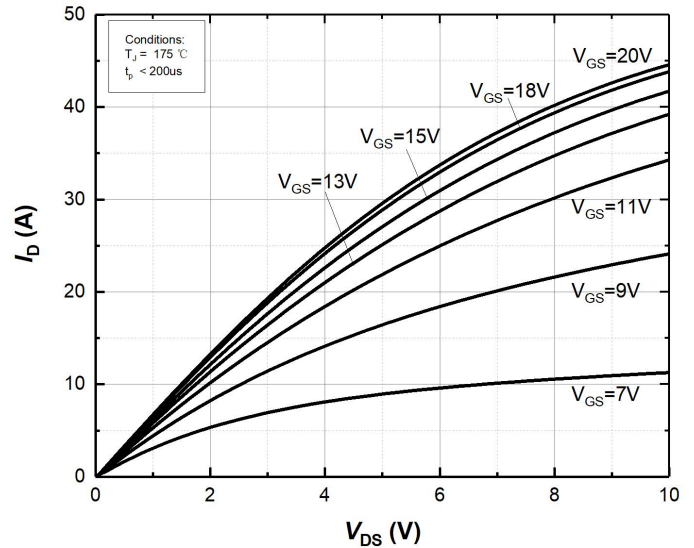


Figure 2. Output characteristics at  $T_j=175^\circ\text{C}$

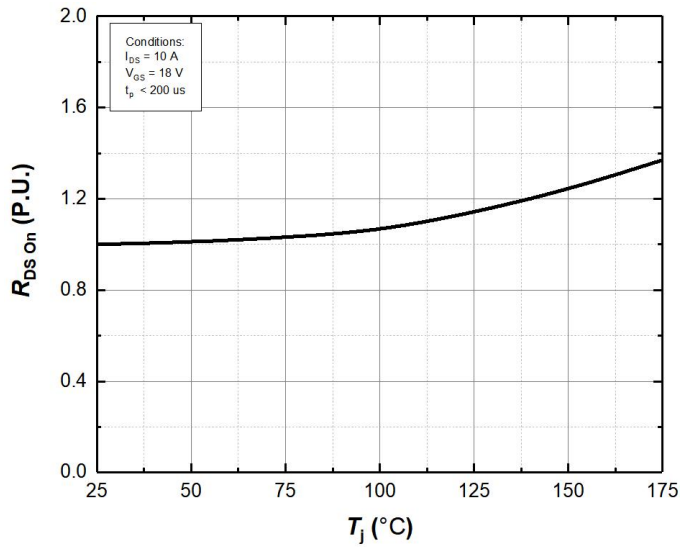


Figure 3. Normalized On-Resistance vs. Temperature

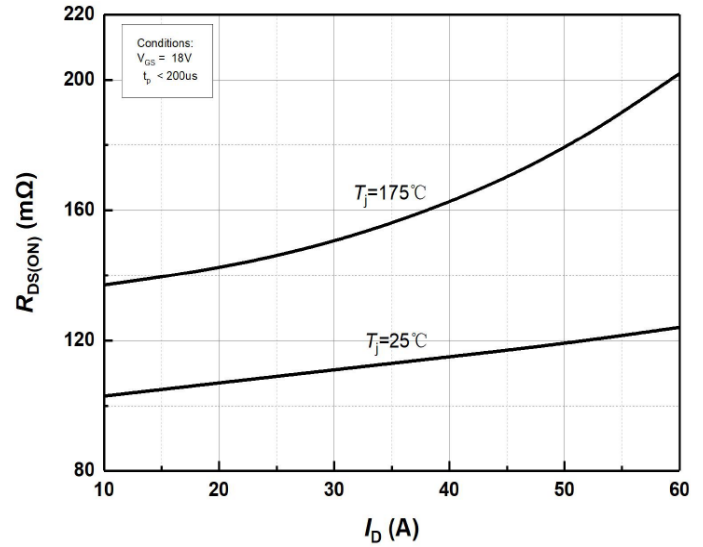


Figure 4. On-Resistance vs. Drain current for Various Temperature

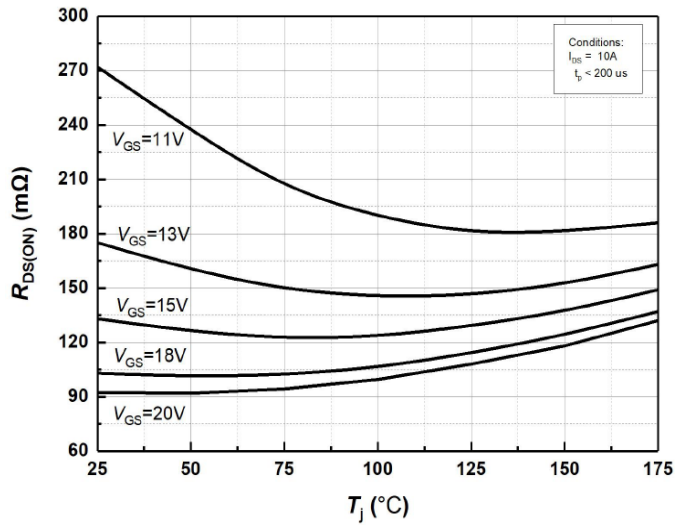


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

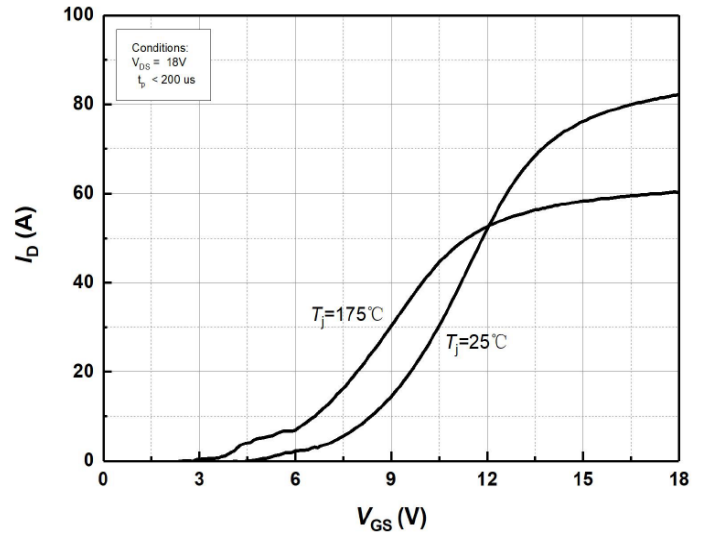


Figure 6. Transfer Characteristics for Various Junction Temperatures

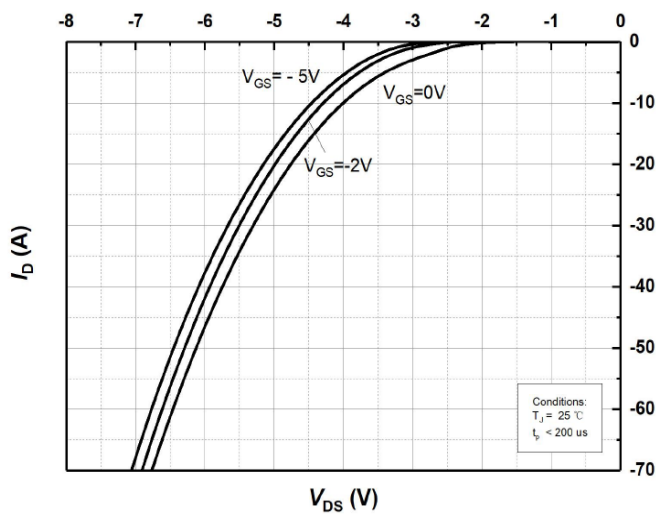


Figure 7. Body Diode Characteristics at  $T_J=25^{\circ}C$

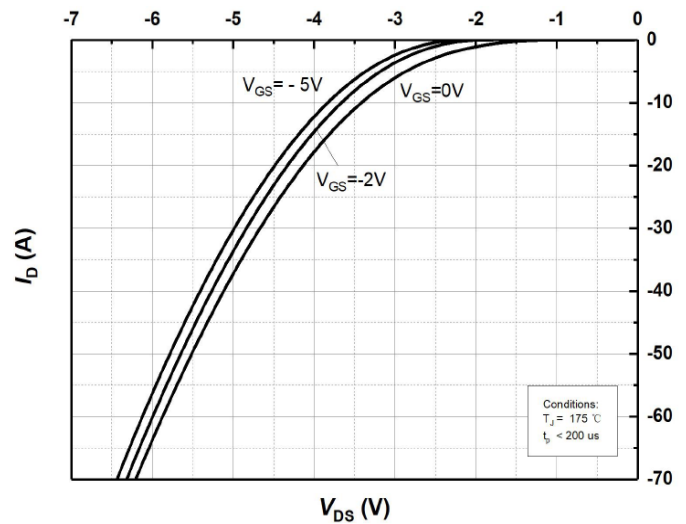


Figure 8. Body Diode Characteristics at  $T_J=175^{\circ}C$

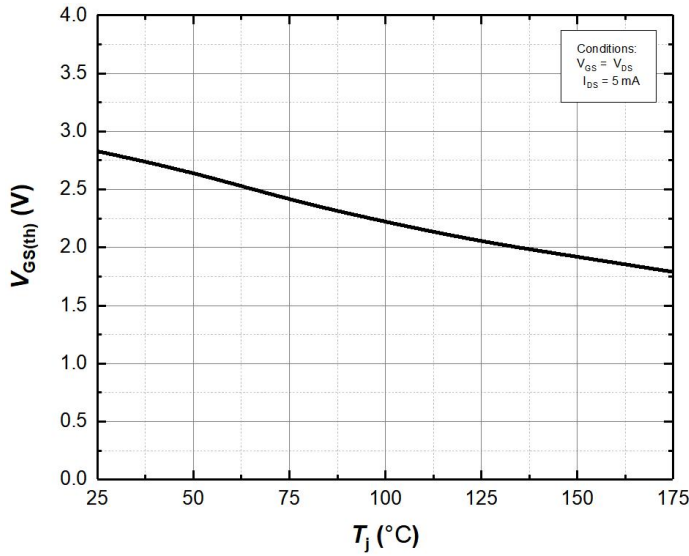


Figure 9. Threshold Voltage vs. Temperature

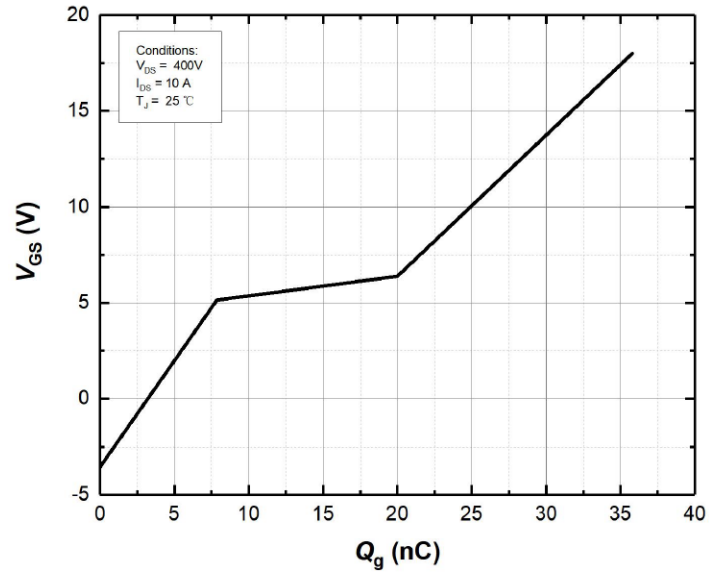


Figure 10 Gate Charge Characteristics

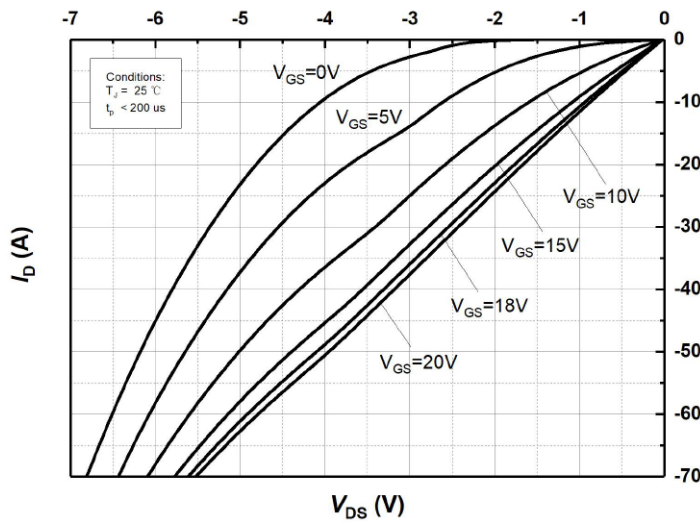


Figure 11. 3rd Quadrant Characteristic at  $T_j=25^\circ \text{C}$

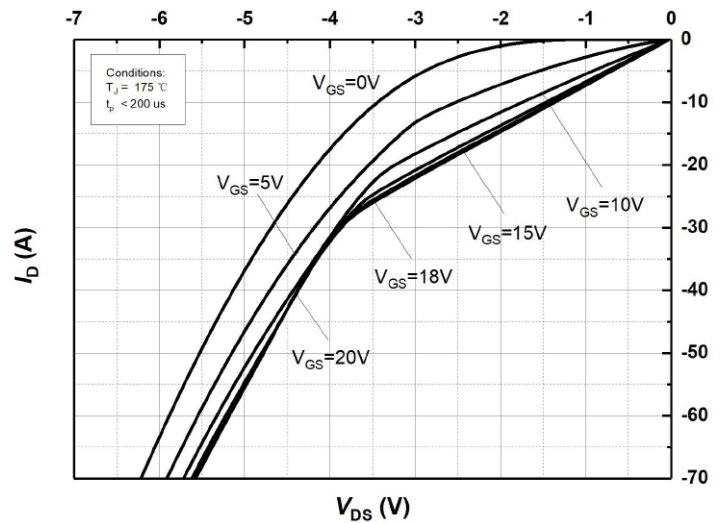


Figure 12. 3rd Quadrant Characteristic at  $T_j=175^\circ \text{C}$

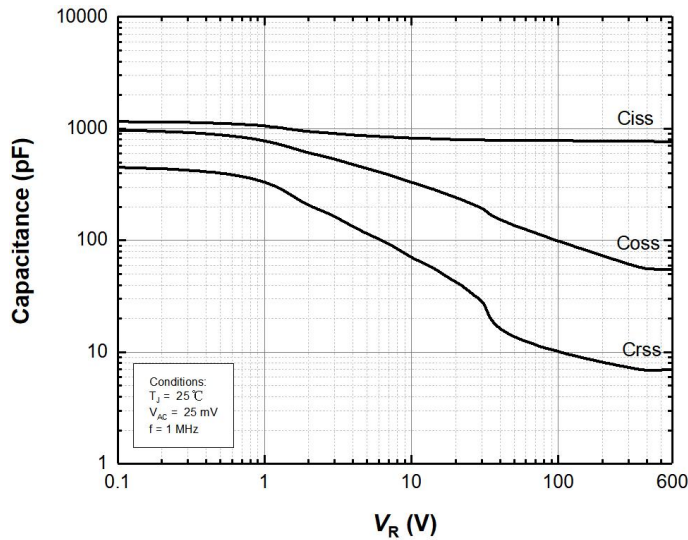


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

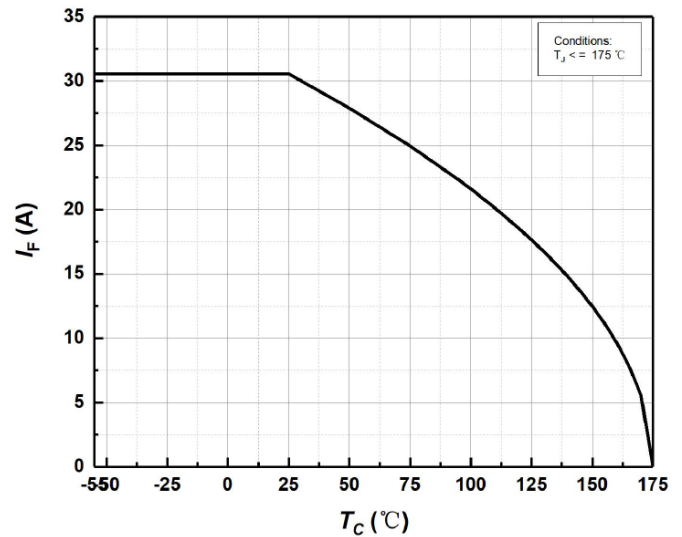


Figure 14. Continuous Drain Current Derating vs Case Temperature

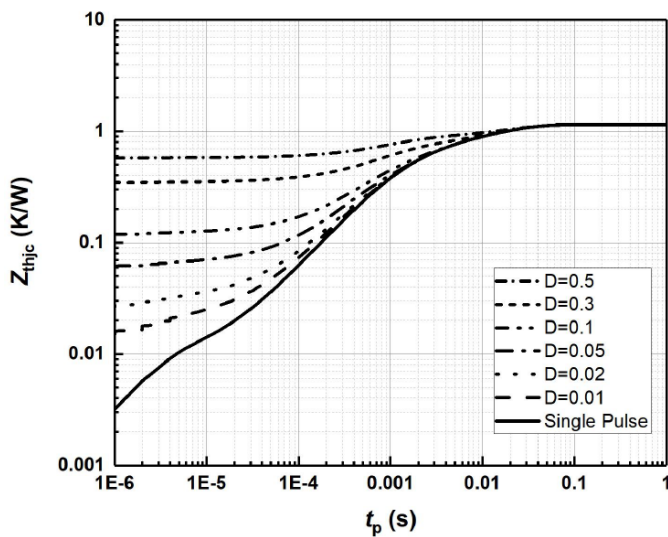


Figure 15. Transient Thermal Impedance (Junction – Case)

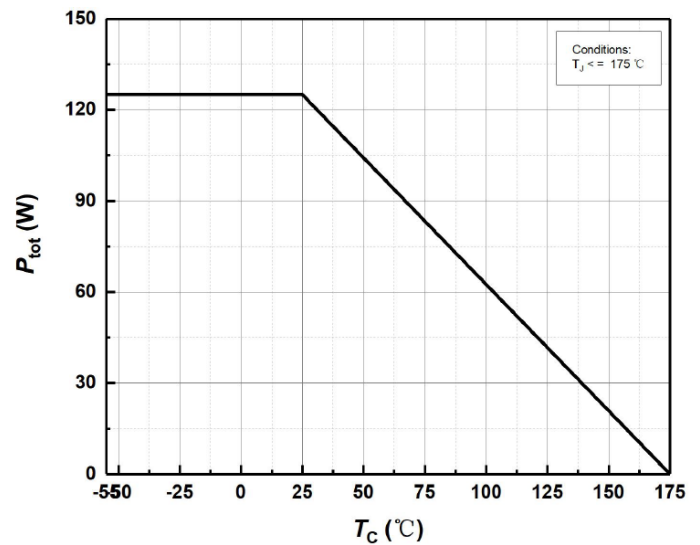


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

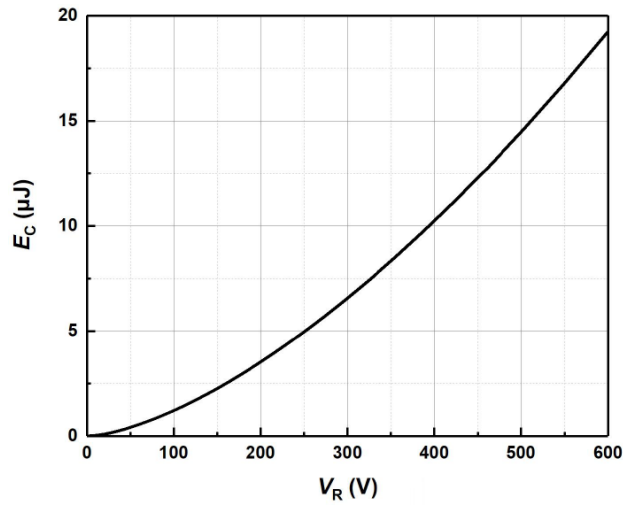


Figure 17. Output Capacitor Stored Energy

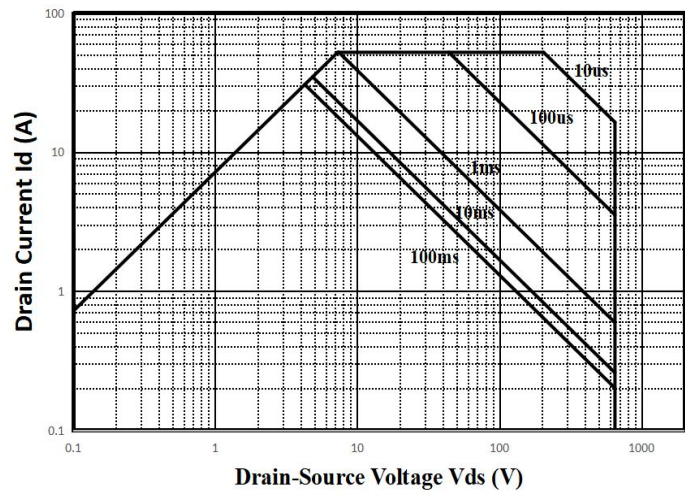
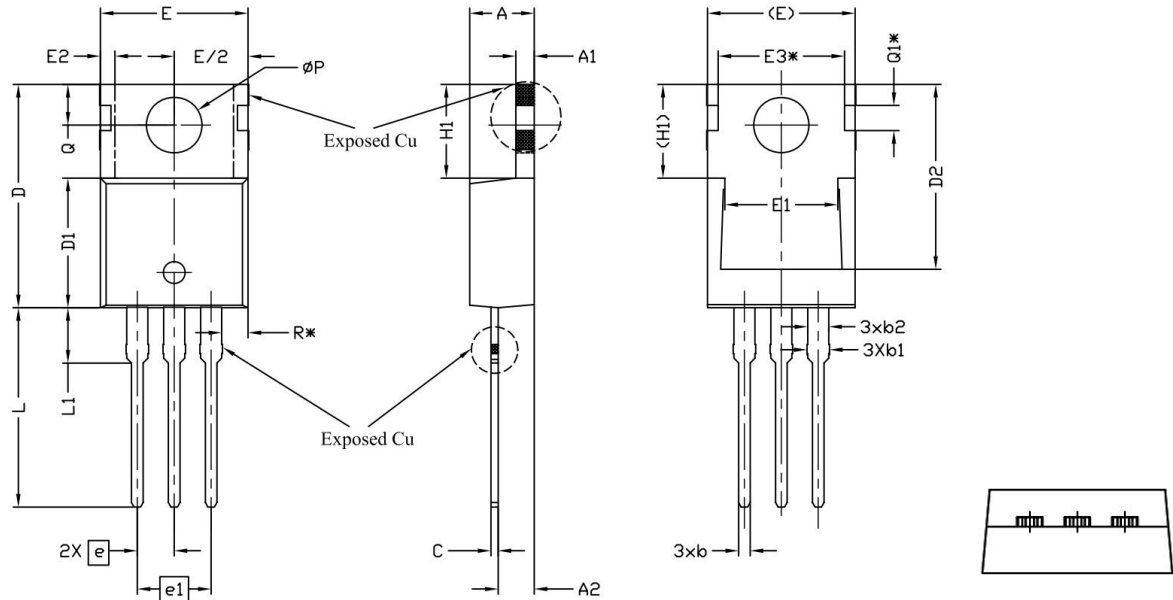


Figure 18. Safe Operating Area



## Package Dimensions

### Package TO-220C



| SYMBOL | DIMENSIONS |       |       | NOTES |
|--------|------------|-------|-------|-------|
|        | MIN.       | NOM.  | MAX.  |       |
| A      | 4.24       | 4.44  | 4.64  |       |
| A1     | 1.15       | 1.27  | 1.40  |       |
| A2     | 2.30       | 2.48  | 2.70  |       |
| b      | 0.70       | 0.80  | 0.90  |       |
| b1     | 1.20       | 1.55  | 1.75  |       |
| b2     | 1.20       | 1.45  | 1.70  |       |
| c      | 0.40       | 0.50  | 0.60  |       |
| D      | 14.70      | 15.37 | 16.00 | 4     |
| D1     | 8.82       | 8.92  | 9.02  |       |
| D2     | 12.43      | 12.73 | 12.83 | 5     |
| E      | 9.96       | 10.16 | 10.36 | 4,5   |
| E1     | 6.86       | 7.77  | 8.89  | 5     |
| E2     | -          | -     | 0.76  | 6     |
| E3*    | 8.70REF.   |       |       |       |
| e      | 2.54BSC    |       |       |       |
| e1     | 5.08BSC    |       |       |       |
| H1     | 6.30       | 6.45  | 6.60  | 5,6   |
| L      | 13.47      | 13.72 | 13.97 |       |
| L1     | 3.60       | 3.80  | 4.00  |       |
| ØP     | 3.75       | 3.84  | 3.93  |       |
| Q      | 2.60       | 2.80  | 3.00  |       |
| Q1*    | 1.73REF.   |       |       |       |
| R*     | 1.82REF.   |       |       |       |



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